



<110> Schroeder, Hartwig

<120> Process for preparing biotin

<130> 0000048792/UP

<140> US 09/622,419

<141> 2000- 08-16

<150> PCT/EP 99/01052

<151> 1999-02-17

<160> 17

<170> PatentIn Release 1.0, version 1.25 (EPO)/WordPerfect

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Asp Lys Ile Ala Asp Gln Ile Ser Asp Ala Val Leu Asp Ala Ile Leu	
20 25 30	
gaa cag gat ccg aaa gca cgc gtt gct tgc gaa acc tac gta aaa acc	144
Glu Gln Asp Pro Lys Ala Arg Val Ala Cys Glu Thr Tyr Val Lys Thr	
35 40 45	
ggc atg gtt tta gtt ggc ggc gaa atc acc acc agc gcc tgg gta gac	192
Gly Met Val Leu Val Gly Gly Glu Ile Thr Thr Ser Ala Trp Val Asp	
50 55 60	
atc gaa gag atc acc cgt aac acc gtt cgc gaa att ggc tat gtg cat	240
Ile Glu Glu Ile Thr Arg Asn Thr Val Arg Glu Ile Gly Tyr Val His	
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tcc gac atg ggc ttt gac gct aac tcc tgt gcg gtt ctg agc gct atc	288
Ser Asp Met Gly Phe Asp Ala Asn Ser Cys Ala Val Leu Ser Ala Ile	
85 90 95	
ggc aaa cag tct cct gac atc aac cag ggc gtt gac cgt gcc gat ccg	336
Gly Lys Gln Ser Pro Asp Ile Asn Gln Gly Val Asp Arg Ala Asp Pro	
100 105 110	
ctg gaa cag ggc gcg ggt gac cag ggt ctg atg ttt ggc tac gca act	384
Leu Glu Gln Gly Ala Gly Asp Gln Gly Leu Met Phe Gly Tyr Ala Thr	
115 120 125	

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aag cca att ctg ccc gct gaa tgg ctg act tct gcc acc aaa ttc ttc Lys Pro Ile Leu Pro Ala Glu Trp Leu Thr Ser Ala Thr Lys Phe Phe 210 215 220	672
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 Gly Met Val Leu Val Gly Gly Glu Ile Thr Thr Ser Ala Trp Val Asp
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 Ile Glu Glu Ile Thr Arg Asn Thr Val Arg Glu Ile Gly Tyr Val His
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 Ser Asp Met Gly Phe Asp Ala Asn Ser Cys Ala Val Leu Ser Ala Ile
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 Gly Lys Gln Ser Pro Asp Ile Asn Gln Gly Val Asp Arg Ala Asp Pro
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 Asn Glu Thr Asp Val Leu Met Pro Ala Pro Ile Thr Tyr Ala His Arg
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 Lys Ile Val Gly Ile Asp Ala Val Val Leu Ser Thr Gln His Ser Glu
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 Glu Ile Asp Gln Lys Ser Leu Gln Glu Ala Val Met Glu Glu Ile Ile
 195 200 205

Lys Pro Ile Leu Pro Ala Glu Trp Leu Thr Ser Ala Thr Lys Phe Phe
 210 215 220
 Ile Asn Pro Thr Gly Arg Phe Val Ile Gly Gly Pro Met Gly Asp Cys
 225 230 235 240

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Arg	His	Gly	Gly 260	Gly	Ala	Phe	Ser	Gly 265	Lys	Asp	Pro	Ser	Lys 270	Val	Asp
Arg	Ser	Ala 275	Ala	Tyr	Ala	Ala	Arg 280	Tyr	Val	Ala	Lys	Asn 285	Ile	Val	Ala
Ala	Gly 290	Leu	Ala	Asp	Arg	Cys 295	Glu	Ile	Gln	Val	Ser 300	Tyr	Ala	Ile	Gly
Val 305	Ala	Glu	Pro	Thr	Ser 310	Ile	Met	Val	Glu	Thr 315	Phe	Gly	Thr	Glu	Lys 320
Val	Pro	Ser	Glu	Gln 325	Leu	Thr	Leu	Leu 330	Val	Arg	Glu	Phe	Phe	Asp 335	Leu
Arg	Pro	Tyr	Gly 340	Leu	Ile	Gln	Met	Leu 345	Asp	Leu	Leu	His	Pro 350	Ile	Tyr
Lys	Glu	Thr 355	Ala	Ala	Tyr	Gly	His 360	Phe	Gly	Arg	Glu	His 365	Phe	Pro	Trp
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Gln	Asp	Ala	Gly	Val	Tyr	Leu	Asp	Ser	Ala	Ala	Thr	Ala	Leu	Lys	Pro	
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Val Ala Gln Cys Tyr Ala Arg Pro Arg Leu Gln Pro Gly Asp Glu Ile	100	105	110	
att gtc agc gtg gca gaa cac cac gcc aac ctc gtc ccc tgg ctg atg				384
Ile Val Ser Val Ala Glu His His Ala Asn Leu Val Pro Trp Leu Met	115	120	125	
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Val Met Val Asp Gly Ala Gln Gly Ala Val His Phe Pro Ala Asp Val	195	200	205	
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Phe Asp Gly Phe Thr Thr Gln Ser Ala Pro Trp Lys Leu Glu Ala Gly	260	265	270	
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Thr Pro Asn Val Ala Gly Val Ile Gly Leu Ser Ala Ala Leu Glu Trp	275	280	285	
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Leu Ala Asp Tyr Asp Ile Asn Gln Ala Glu Ser Trp Ser Arg Ser Leu	290	295	300	
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325 330 335	
cat cat agc gat atg gtg acg ctg ctg gcg gag tac ggt att gcc ctg	1056
His His Ser Asp Met Val Thr Leu Leu Ala Glu Tyr Gly Ile Ala Leu	
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Arg Ala Gly Gln His Cys Ala Gln Pro Leu Leu Ala Glu Leu Gly Val	
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Tyr Glu Ala Ala Arg Glu Lys Val Ala Gln Leu Leu Asn Ala Pro Asp	
65 70 75 80	
Asp Lys Thr Ile Val Trp Thr Arg Gly Thr Thr Glu Ser Ile Asn Met	
85 90 95	
Val Ala Gln Cys Tyr Ala Arg Pro Arg Leu Gln Pro Gly Asp Glu Ile	
100 105 110	
Ile Val Ser Val Ala Glu His His Ala Asn Leu Val Pro Trp Leu Met	
115 120 125	

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 145 150 155 160
 Ser Arg Ile Leu Ala Leu Gly Gln Met Ser Asn Val Thr Gly Gly Cys
 165 170 175
 Pro Asp Leu Ala Arg Ala Ile Thr Phe Ala His Ser Ala Gly Met Val
 180 185 190
 Val Met Val Asp Gly Ala Gln Gly Ala Val His Phe Pro Ala Asp Val
 195 200 205
 Gln Gln Leu Asp Ile Asp Phe Tyr Ala Phe Ser Gly His Lys Leu Tyr
 210 215 220
 Gly Pro Thr Gly Ile Gly Val Leu Tyr Gly Lys Ser Glu Leu Leu Glu
 225 230 235 240
 Ala Met Ser Pro Trp Leu Gly Gly Gly Lys Met Val His Glu Val Ser
 245 250 255
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 His His Ser Asp Met Val Thr Leu Leu Ala Glu Tyr Gly Ile Ala Leu
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Pro Arg Val Ala Glu Lys Met Met Gln Phe Met Thr Met Asp Gly Thr	
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ttt ggt aac ccg gcc tcc cgt tct cac cgt ttc ggc tgg cag gct gaa	144
Phe Gly Asn Pro Ala Ser Arg Ser His Arg Phe Gly Trp Gln Ala Glu	
35 40 45	
gaa gcg gta gat atc gcc cgt aat cag att gcc gat ctg gtc ggc gct	192
Glu Ala Val Asp Ile Ala Arg Asn Gln Ile Ala Asp Leu Val Gly Ala	
50 55 60	
gat ccg cgt gaa atc gtc ttt acc tct ggt gca acc gaa tct gac aac	240
Asp Pro Arg Glu Ile Val Phe Thr Ser Gly Ala Thr Glu Ser Asp Asn	
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Leu Ala Ile Lys Gly Ala Ala Asn Phe Tyr Gln Lys Lys Gly Lys His	
85 90 95	
atc atc acc agc aaa acc gaa cac aaa gcg gta ctg gat acc tgc cgt	336
Ile Ile Thr Ser Lys Thr Glu His Lys Ala Val Leu Asp Thr Cys Arg	
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cag ctg gag cgc gaa ggt ttt gaa gtc acc tac ctg gca ccg cag cgt	384
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Thr Ile Leu Val Ser Ile Met His Val Asn Asn Glu Ile Gly Val Val	
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Gln Asp Ile Ala Ile Gly Glu Met Cys Arg Ala Arg Gly Ile Ile	
165 170 175	
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Tyr His Val Asp Ala Thr Gln Ser Val Gly Lys Leu Pro Ile Asp Leu	
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agc cag ttg aaa gtt gac ctg atg tct ttc tcc ggt cac aaa atc tat	624
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tcc ggc act ctg cct gtt cac cag atc gtc gga atg ggc gag gcc tat Ser Gly Thr Leu Pro Val His Gln Ile Val Gly Met Gly Glu Ala Tyr 245 250 255	768
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Ser	Gly	Thr	Leu	Pro	Val	His	Gln	Ile	Val	Gly	Met	Gly	Glu	Ala	Tyr	245	250	255	
Arg	Ile	Ala	Lys	Glu	Glu	Met	Ala	Thr	Glu	Met	Glu	Arg	Leu	Arg	Gly	260	265	270	
Leu	Arg	Asn	Arg	Leu	Trp	Asn	Gly	Ile	Lys	Asp	Ile	Glu	Glu	Val	Tyr	275	280	285	
Leu	Asn	Gly	Asp	Leu	Glu	His	Gly	Ala	Pro	Asn	Ile	Leu	Asn	Val	Ser	290	295	300	

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 Thr Ile Glu Leu Val Arg Lys Ser Ile Gly Arg Leu Arg Asp Leu Ser
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Gly Ile Asn Leu Val Ala Asn Ser Trp Gly Asn Ser Asn Val Arg Ala	

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 Ala Thr Glu Lys Met Glu Asn Val Arg Lys Arg Ala Ser Leu Phe Ile
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 Asn Ala Arg Ser Ala Glu Glu Leu Val Phe Val Arg Gly Thr Thr Glu
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 Gly Asp Asn Ile Ile Ile Ser Gln Met Glu His His Ala Asn Ile Val
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 Pro Trp Gln Met Leu Cys Ala Arg Val Gly Ala Glu Leu Arg Val Ile
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 Pro Leu Asn Pro Asp Gly Thr Leu Gln Leu Glu Thr Leu Pro Thr Leu
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 Pro Asp Leu Thr Leu Tyr Gly Pro Gln Asn Arg Leu Gly Val Ile Ala
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Asn Val His Arg Ser Gln Phe Ala Glu Ala Gln Arg Leu Thr Ala Arg
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Tyr Glu Ala Ala Arg Glu Lys Val Ala Gln Leu Leu Asn Ala Pro Asp
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Asp Lys Thr Ile Val Trp Thr Arg Gly Thr Thr Glu Ser Ile Asn Met
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Val Ala Gln Cys Tyr Ala Arg Pro Arg Leu Gln Pro Gly Asp Glu Ile
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Ser Arg Ile Leu Ala Leu Gly Gln Met Ser Asn Val Thr Gly Gly Cys
 165 170 175

Pro Asp Leu Ala Arg Ala Ile Thr Phe Ala His Ser Ala Gly Met Val
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Val Met Val Asp Gly Ala Gln Gly Ala Val His Phe Pro Ala Asp Val
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Gln Gln Leu Asp Ile Asp Phe Tyr Ala Phe Ser Gly His Lys Leu Tyr
 210 215 220

Gly Pro Thr Gly Ile Gly Val Leu Tyr Gly Lys Ser Glu Leu Leu Glu
 225 230 235 240

Ala Met Ser Pro Trp Leu Gly Gly Gly Lys Met Val His Glu Val Ser
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Phe Asp Gly Phe Thr Thr Gln Ser Ala Pro Trp Lys Leu Glu Ala Gly
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Thr Pro Asn Val Ala Gly Val Ile Gly Leu Ser Ala Ala Leu Glu Trp

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Ala Thr Leu Ala Glu Asp Ala Leu Ala Lys Arg Pro Gly Phe Arg Ser		
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Phe Arg Cys Gln Asp Ser Ser Leu Leu Ala Phe Asp Phe Ala Gly Val		
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His His Ser Asp Met Val Thr Leu Leu Ala Glu Tyr Gly Ile Ala Leu		
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Thr Gly Thr Leu Arg Ala Ser Phe Ala Pro Tyr Asn Thr Lys Ser Asp		
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Lys His Leu Phe Thr Ser Glu Ser Val Ser Glu Gly His Pro Asp Lys	
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Ile Ala Asp Gln Ile Ser Asp Ala Val Leu Asp Ala Ile Leu Glu Gln	
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Asp Pro Lys Ala Arg Val Ala Cys Glu Thr Tyr Val Lys Thr Gly Met	
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Val Leu Val Gly Gly Glu Ile Thr Thr Ser Ala Trp Val Asp Ile Glu	
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Gln Ser Pro Asp Ile Asn Gln Gly Val Asp Arg Ala Asp Pro Leu Glu	
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Thr Asp Val Leu Met Pro Ala Pro Ile Thr Tyr Ala His Arg Leu Val	
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Pro Asp Ala Lys Ser Gln Val Thr Phe Gln Tyr Asp Asp Gly Lys Ile	
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Val Gly Ile Asp Ala Val Val Leu Ser Thr Gln His Ser Glu Glu Ile	
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Thr Gly Arg Lys Ile Ile Val Asp Thr Tyr Gly Gly Met Ala Arg His	
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Gly	Thr	Thr	Glu	Ser	Ile	Asn	Met	Val	Ala	Gln	Cys	Tyr	Ala	Arg	Pro	
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cgt	ctg	caa	ccg	ggc	gat	gag	att	att	gtc	agc	gtg	gca	gaa	cac	cac	2141
Arg	Leu	Gln	Pro	Gly	Asp	Glu	Ile	Ile	Val	Ser	Val	Ala	Glu	His	His	
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Val	Val	Lys	Leu	Pro	Leu	Asn	Ala	Gln	Arg	Leu	Pro	Asp	Val	Asp	Leu	
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Ala	Pro	Trp	Lys	Leu	Glu	Ala	Gly	Thr	Pro	Asn	Val	Ala	Gly	Val	Ile	
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Glu Gln Asp Pro Lys Ala Arg Val Ala Cys Glu Thr Tyr Val Lys Thr
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Gly Met Val Leu Val Gly Gly Glu Ile Thr Thr Ser Ala Trp Val Asp
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Ile Glu Glu Ile Thr Arg Asn Thr Val Arg Glu Ile Gly Tyr Val His
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Ser Asp Met Gly Phe Asp Ala Asn Ser Cys Ala Val Leu Ser Ala Ile

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Asn	Glu	Thr	Asp	Val	Leu	Met	Pro	Ala	Pro	Ile	Thr	Tyr	Ala	His	Arg
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Leu	Val	Gln	Arg	Gln	Ala	Glu	Val	Arg	Lys	Asn	Gly	Thr	Leu	Pro	Trp
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Leu	Arg	Pro	Asp	Ala	Lys	Ser	Gln	Val	Thr	Phe	Gln	Tyr	Asp	Asp	Gly
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Lys	Ile	Val	Gly	Ile	Asp	Ala	Val	Val	Leu	Ser	Thr	Gln	His	Ser	Glu
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Glu	Ile	Asp	Gln	Lys	Ser	Leu	Gln	Glu	Ala	Val	Met	Glu	Glu	Ile	Ile
			195										205		
Lys	Pro	Ile	Leu	Pro	Ala	Glu	Trp	Leu	Thr	Ser	Ala	Thr	Lys	Phe	Phe
			210										220		
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Ala	Gly	Leu	Ala	Asp	Arg	Cys	Glu	Ile	Gln	Val	Ser	Tyr	Ala	Ile	Gly
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Val	Ala	Glu	Pro	Thr	Ser	Ile	Met	Val	Glu	Thr	Phe	Gly	Thr	Glu	Lys
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Lys	Glu	Thr	Ala	Ala	Tyr	Gly	His	Phe	Gly	Arg	Glu	His	Phe	Pro	Trp
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<400> 15

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Gln	Asp	Ala	Gly	Val	Tyr	Leu	Asp	Ser	Ala	Ala	Thr	Ala	Leu	Lys	Pro	20	25	30	
Glu	Ala	Val	Val	Glu	Ala	Thr	Gln	Gln	Phe	Tyr	Ser	Leu	Ser	Ala	Gly	35	40	45	
Asn	Val	His	Arg	Ser	Gln	Phe	Ala	Glu	Ala	Gln	Arg	Leu	Thr	Ala	Arg	50	55	60	
Tyr	Glu	Ala	Ala	Arg	Glu	Lys	Val	Ala	Gln	Leu	Leu	Asn	Ala	Pro	Asp	65	70	75	80
Asp	Lys	Thr	Ile	Val	Trp	Thr	Arg	Gly	Thr	Thr	Glu	Ser	Ile	Asn	Met	85	90	95	
Val	Ala	Gln	Cys	Tyr	Ala	Arg	Pro	Arg	Leu	Gln	Pro	Gly	Asp	Glu	Ile	100	105	110	
Ile	Val	Ser	Val	Ala	Glu	His	His	Ala	Asn	Leu	Val	Pro	Trp	Leu	Met	115	120	125	
Val	Ala	Gln	Gln	Thr	Gly	Ala	Lys	Val	Val	Lys	Leu	Pro	Leu	Asn	Ala	130	135	140	
Gln	Arg	Leu	Pro	Asp	Val	Asp	Leu	Leu	Pro	Glu	Leu	Ile	Thr	Pro	Arg	145	150	155	160
Ser	Arg	Ile	Leu	Ala	Leu	Gly	Gln	Met	Ser	Asn	Val	Thr	Gly	Gly	Cys	165	170	175	
Pro	Asp	Leu	Ala	Arg	Ala	Ile	Thr	Phe	Ala	His	Ser	Ala	Gly	Met	Val	180	185	190	
Val	Met	Val	Asp	Gly	Ala	Gln	Gly	Ala	Val	His	Phe	Pro	Ala	Asp	Val	195	200	205	
Gln	Gln	Leu	Asp	Ile	Asp	Phe	Tyr	Ala	Phe	Ser	Gly	His	Lys	Leu	Tyr	210	215	220	
Gly	Pro	Thr	Gly	Ile	Gly	Val	Leu	Tyr	Gly	Lys	Ser	Glu	Leu	Leu	Glu	225	230	235	240
Ala	Met	Ser	Pro	Trp	Leu	Gly	Gly	Gly	Lys	Met	Val	His	Glu	Val	Ser	245	250	255	
Phe	Asp	Gly	Phe	Thr	Thr	Gln	Ser	Ala	Pro	Trp	Lys	Leu	Glu	Ala	Gly	260	265	270	

Thr Pro Asn Val Ala Gly Val Ile Gly Leu Ser Ala Ala Leu Glu Trp
 275 280 285

Leu Ala Asp Tyr Asp Ile Asn Gln Ala Glu Ser Trp Ser Arg Ser Leu
 290 295 300

Ala Thr Leu Ala Glu Asp Ala Leu Ala Lys Arg Pro Gly Phe Arg Ser
 305 310 315 320

Phe Arg Cys Gln Asp Ser Ser Leu Leu Ala Phe Asp Phe Ala Gly Val
 325 330 335

His His Ser Asp Met Val Thr Leu Leu Ala Glu Tyr Gly Ile Ala Leu
 340 345 350

Arg Ala Gly Gln His Cys Ala Gln Pro Leu Leu Ala Glu Leu Gly Val
 355 360 365

Thr Gly Thr Leu Arg Ala Ser Phe Ala Pro Tyr Asn Thr Lys Ser Asp
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Val Asp Ala Leu Val Asn Ala Val Asp Arg Ala Leu Glu Leu Leu Val
 385 390 395 400

Asp

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<220>
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<400> 16

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32

<210> 17
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 <212> DNA
 <213> Artificial Sequence

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<400> 17

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28